

Napa, California

The City of Napa experienced 27 floods between 1862 and 1997. In 1996, residents, businesses, local government, and numerous resource agencies became part of a community coalition to create a flood protection project - widening the river. The project restored over 650 acres of tidal wetlands, protecting 2,700 homes, 350 businesses and over 50 public properties from flood levels at a projected savings of \$26 million annually in flood damage costs. In 1998, Napa culminated two years of community planning and partnering with the development of a 20-year Napa Flood Management Plan, and voters approved a 1/2 cent sales tax increase to provide the local funding match for Federal, State, and private sector funds to implement the plan. All up and down the river, the plan has already resulted in new energy and investment, including renovation of a historical structure on the banks of the Napa River as a major tourist center, a non-profit arts and design school for promising arts students, and three planned hotels in the City of Napa. Before the flood management plan, the City could not attract lodging due to investor fear of damages from frequent flooding.

Wilmington, North Carolina

In 1989, devastation from Hurricane Hugo created pressure in North Carolina for more stringent building codes to help buildings withstand high winds. As an example of mitigation, and to bolster itself against future disasters, Wilmington spent \$26 million on the Sweeney Water Plant. Funds were used to relocate the facility outside the floodplain, design the new facility to sustain 120 mph winds, and provide two 1,250 kW diesel generators to supply power for 2-3 days to ensure continued operation. The new system performed as expected following both Hurricane Fran in 1996 and Hurricane Floyd in 1999. According to local officials, if the old system had been in place and failed, the results would have been catastrophic, resulting in thousands of people without drinking water and sewage disposal for weeks.

Disaster Prevention: A Catalyst for Change

There are two reasons why disaster preparedness and hazard mitigation planning should be at the top of your community's agenda. First, and most importantly, you will be prepared for the inevitable disaster before it strikes, saving lives, property, time, money, and resources. Second, disaster preparedness and planning can unite constituencies in your community behind a common goal. Citizens are usually willing to support initiatives that save lives and protect property. You can use this effort and goodwill to act as a catalyst for change in confronting other challenges your community may face.

By far, the best time to begin the process of incorporating disaster resistance into your community is *before* disaster strikes. A planning process can be carefully developed that identifies hazards, assesses vulnerabilities, and identifies and prioritizes hazard mitigation actions. In an effort to promote pre-disaster planning and mitigation, FEMA established *Project Impact: Building Disaster Resistant Communities*. This new initiative supports communities with a framework to move towards a more sustainable future. *Project Impact* partnerships include FEMA, but the most

important partners are within the community local government, community planning and design professionals, businesses, civic and volunteer groups, emergency services, and individual citizens.

Essentially, *Project Impact* is a planning-based approach that challenges and supports communities to become disaster resistant. FEMA encourages your community to participate in the four phases of the Project Impact Initiative.

- **Building Community Partnerships.** This initiative is most effective if it draws upon the experiences, resources, and policies already in place in your community. Identify and recruit Project Impact Partners that reflect all sectors: local government leaders, civic and volunteer organizations, businesses, and individual citizens.
- **Assessing Risks.** Identify hazards to determine which areas of your community are affected by disasters, how likely it is that the disaster may occur, and the magnitude of the disaster. Assess the vulnerability of buildings, utilities, and transportation systems serving the community.
- **Prioritizing Mitigation Efforts.** Identify mitigation priorities and mitigation measures to address these priorities. Determine resources needed to implement these measures and identify potential sources for technical and financial assistance.
- **Communicating Success.** Use the print, radio, and television media to build support for the *Project Impact* initiative

and to bring the message of the benefits of mitigation to all residents and businesses in the community.

Hazard Mitigation: The Key to Disaster Resistance

Hazard mitigation is the cornerstone of FEMA's approach to reducing our nation's vulnerability to disasters. But what does it mean when disaster recovery experts use the phrase hazard mitigation? Hazard mitigation is defined as the actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage.

Hazard mitigation focuses attention and resources on actions that produce successive benefits over time. Additionally, the money your community spends today on mitigation can substantially reduce human suffering and the demand for even more money after future disasters.

Cost-effective mitigation measures are key to reducing disaster losses in your community. If your community is willing to

A large portion of Albany State College in Georgia, flooded in 1994, has been relocated to higher ground using Federal funding.



Tulsa, Oklahoma

From its earliest years, Tulsa has experienced repetitive, dangerous floods. The city's response was always the same: emergency response and recovery, reconstruction as quickly as possible, and denial that floods would recur.

In 1974, after suffering through three major floods in a single year, Tulsa's citizens initiated a public debate about floodplain management. In 1976, Tulsa experienced another disastrous flooding event that left 3 people dead, and 3,000 buildings damaged at a loss of \$40 million. Citizens demanded action and the city responded. It enacted a floodplain building moratorium and hired its first hydrologist. Comprehensive floodplain management regulations were developed and stormwater detention for new development was required. The city instituted an alert and warning system and began drainage planning for major watersheds.

However, when the 1984 Memorial Day Flood struck, 14 people were killed, 7,000 buildings were damaged or destroyed, and losses exceeded \$80 million. The city placed an even greater emphasis on mitigation and flood-loss reduction following this disaster. In 1986, Tulsa passed an ordinance to ensure that a stable source of funds, through stormwater utility fees, would be available for floodplain management planning, construction, and maintenance of flood control and stormwater facilities. Over the last 15 years, Tulsa has cleared more than 900 buildings from its floodplains and constructed many small flood control and storm water management projects throughout the city.

Since floodplain management regulations were first enacted in 1977, none of the structures built in compliance with these regulations has been damaged. Tulsa has also achieved FEMA's highest CRS rating, earning for its citizens the lowest insurance rates in the country. Continuing its disaster prevention efforts, Tulsa became a *Project Impact* community in 1998.

Tulsa's successful flood mitigation program is attributed to several factors:

The city realized it had to accept responsibility and not expect Federal and State government to solve all of its problems. Localized storm drainage projects were integrated into a comprehensive watershed management plan.

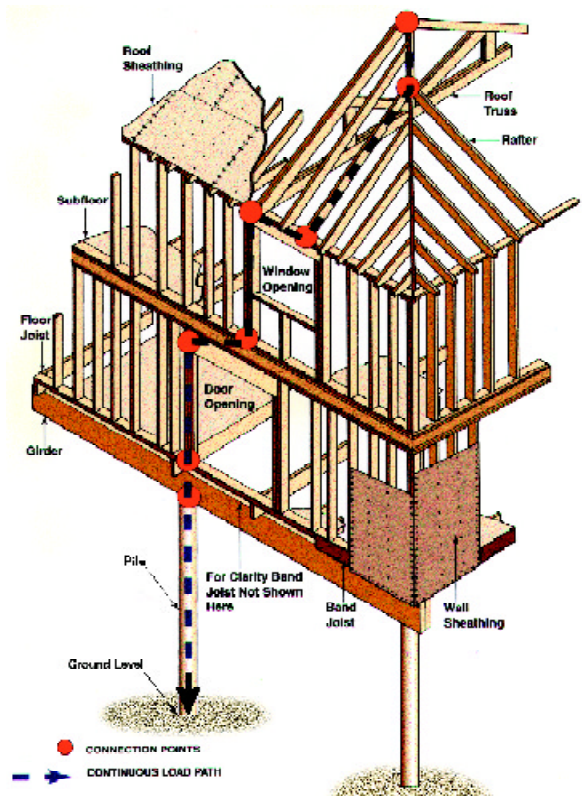
The city required watershed development to take into account design elements based upon the ultimate full development of the watershed.

Multiple objectives, such as recreation and environmental quality, were included in the city's recovery plan.

Since the city learned that rebuilding to pre-disaster conditions only set the stage for more losses from future disasters, mitigation and flood-loss reduction became the central focus of flood recovery.

mitigate, opportunities can be found. Ideally, mitigation actions are implemented before disasters occur. However, the availability of post-disaster financial assistance is often what makes it possible to take these actions. An effective planning process takes advantage of mitigation opportunities that follow a disaster, when hazard awareness is high. Attention to your mitigation opportunities will result in a more disaster-resistant and sustainable community.

Mitigation measures depend upon the unique characteristics associated with specific hazards. Hazard mitigation planning for floods can involve strengthening floodplain management regulations, identifying future opportunities for acquisition of floodprone properties, and prioritizing flood reduction mitigation measures. Mitigation measures for coastal areas at risk from hurricanes include steering development away from storm surge zones as well as improvements to and enforcement of building code requirements to strengthen buildings against high wind damage. For earthquake hazards, mitigation measures include structural design standards to allow buildings to withstand ground shaking and soil liquefaction or refined engineering standards to reduce landslide potential. In areas where suburban development encroaches upon areas susceptible to wildfires, mitigation measures can include development setbacks, adequate transportation access, water supply, and vegetation management.



Building code revisions can strengthen the ability of structures to withstand high winds, as illustrated in this elevated, two-story wood-frame building.

American Planning Association (APA) and FEMA Partner on Prevention Planning

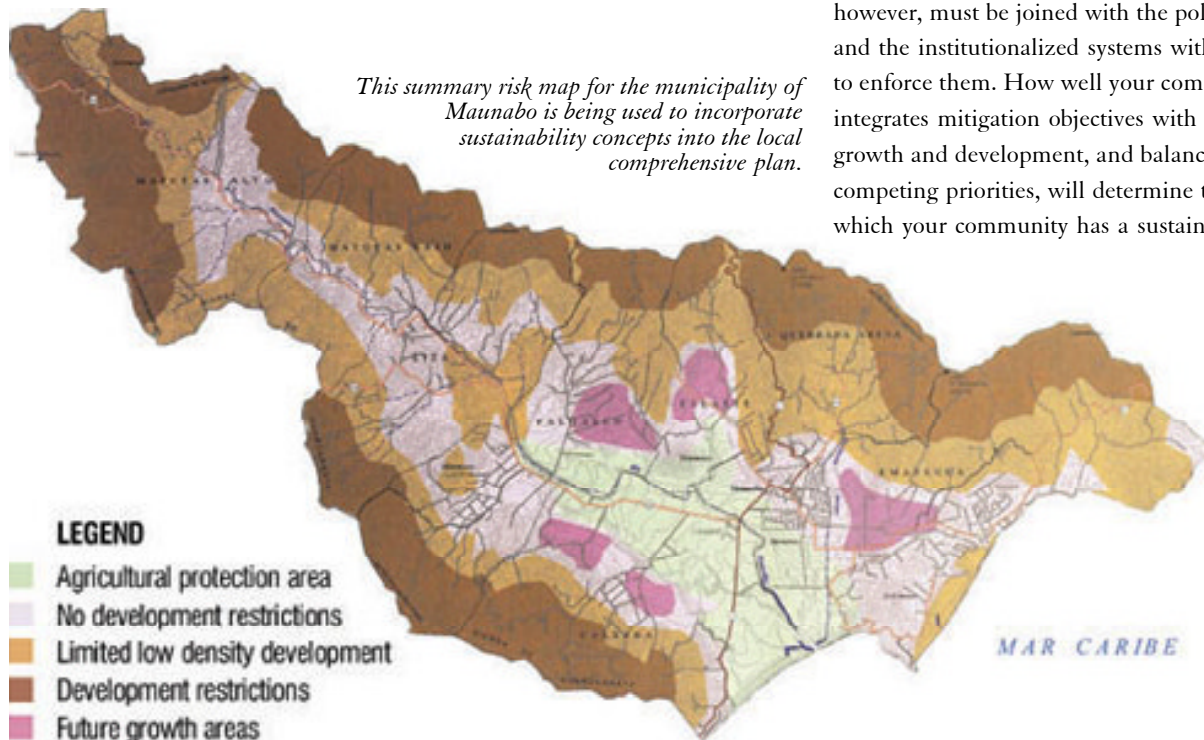
In 1998, FEMA and the American Planning Association (APA) published *Planning for Post-Disaster Recovery and Reconstruction*. Complete with case studies, this report describes an approach for integrating mitigation planning and the concept of disaster resistance into on-going community planning and development activities. The report contains planning and administrative tools, including aids for conducting damage assessments and detailed descriptions of a full range of emergency planning, zoning, design, and financial management tools. A model recovery and reconstruction ordinance is also included. This report, APA's PAS Report No. 483/484, is available from FEMA at (800) 480-2520.

An emerging challenge for local governments and planners is to address competing mitigation needs in regions threatened by multiple hazards. In early 1999, FEMA initiated a community-level planning effort for seven rural municipalities in Puerto Rico devastated by Hurricane Georges. The effort involved developing a multi-risk assessment methodology that evaluated flooding, landslides, hurricane winds, and earthquake hazards. The risk assessment was then incorporated into a land suitability analysis that identified future growth areas, areas where specific engineering standards should be applied, and areas where new, intensive development

should be discouraged (see Map of Maunabo). This information will allow these communities to incorporate mitigation considerations into their daily operations.

Local governments have a variety of techniques available to influence the location, type, intensity, design, quality, and timing of development. Many of these tools can be used to mitigate natural hazards and enhance your community's resilience and ability to recover from hazards. Eliminating development in severe hazard risk areas or influencing the type and density of development in hazard-prone areas can be used. Any and all selected mitigation measures, however, must be joined with the political will and the institutionalized systems with the power to enforce them. How well your community integrates mitigation objectives with community growth and development, and balances competing priorities, will determine the extent to which your community has a sustainable future.

This summary risk map for the municipality of Maunabo is being used to incorporate sustainability concepts into the local comprehensive plan.



Oakland Firestorms

In October 1991, a major fire ravaged the hills of Oakland, California. Over the span of 4 days, more than 1,800 acres of land and 3,000 residential units were destroyed. The fire burned through residential neighborhoods, wooded and grassland hillsides. After immediate danger from the fire had passed concerns arose about the potential for erosion and mudslides on the burned slopes. The fire left soils unprotected from wind and rainfall. The slopes were steep, as much as 60 degrees, and California's rainy season was about to begin.

Oakland asked for assistance in developing an emergency short-term action plan for erosion and drainage control of the 1,800-acre burned area. The city assessed the damaged areas and met with numerous State and Federal agencies assisting with restoration and cleanup. Together, an action plan was developed and implemented that focused on slope treatments, including detailed installation guidelines, quantities of materials required, and cost estimates. Emergency erosion control implementation included aerial seeding by helicopter of the entire burn area, hydro mulching, construction of silt fences and debris dams, installation of trash racks, and protection of storm drain inlets.

The city also studied and evaluated potential landslide risks in the firestorm area. The study was used to identify public and private properties with relatively high, medium, and low levels of landslide risk. Study results were also used to develop appropriate policies for redevelopment that protected public safety while not placing an unnecessary burden on the homeowners affected.

Oakland implemented the action plan throughout the winter of 1991-1992 and site monitoring and maintenance continued through the winter months. Implementation of this plan had a significant impact on reducing the damage caused by flooding, debris and sediment flows, slides, blowing ash, and erosion on property and water bodies.

As a result of the firestorm, the city also implemented new development regulations that seek to deter future firestorms in Fire Hazard Areas. New development codes require roofing materials that prevent fires from spreading rooftop to rooftop. New windows preventing radiant heat explosions, non-combustible siding, less flammable vegetation, and the creation of defensible spaces are now required to prevent the spread of fire.

A 1999 development ordinance addressed density issues in Fire Hazard Areas. Before additional structures can be built on property located in Fire Hazard Areas, the city must evaluate their plans, thereby preventing development conditions that can lead to increased fire risk.

Oakland has also increased access in and out of high fire hazard areas. In the 1991 firestorms, several people were left stranded behind the fireline because smoke prevented them from exiting through the only access road available.

Oakland's 1991 experiences have improved the commitment of the city and its citizens not only to understanding the threat wildfires pose, but also how to prevent them in the future.

Building standards specify how buildings are constructed. In addition to traditional building codes, building standards can include flood-proofing requirements, seismic design standards, and wind-bracing and anchoring requirements for new construction and similar requirements for retrofitting existing buildings.

Development regulations, which may include separate zoning and subdivision ordinances, regulate the location, type, and intensity of new development. Development regulations can include flood-zone regulations; setbacks from faults, steep slopes, and coastal erosion areas; and overlay zoning districts that apply additional development standards for sensitive lands, such as wetlands, dunes, and hillsides.

Capital improvement programs can be an effective way to implement mitigation throughout a community. Local public policies supporting hazard mitigation should be incorporated into these programs. Locating schools, fire stations, and other public buildings, streets, storm sewers, and other utilities outside of high hazard areas is an obvious policy. When siting public facilities in hazardous locations is necessary, communities can incorporate hazard reduction measures into the design or require retrofits where economically feasible. Public facility siting is a key determinant of the location of new privately financed growth in a community. As such, facilities, particularly roads and utilities, should not be sited where they have the potential to encourage growth in high hazard zones.

Land and property acquisition means purchasing properties in hazard-prone areas with public funds, and restricting development to uses that are less vulnerable to disaster-related damages. This can be accomplished through acquisition of undeveloped lands, acquisition of development rights, transfer of development rights to lower-risk areas, relocation of buildings, and acquisition of damaged buildings.

Taxation and fiscal policies can be used to distribute the public costs of private development of high hazard areas more equitably, specifically shifting more of the cost burden directly onto owners of such properties. Employing impact taxes to cover the public costs of development in areas of high hazards or providing tax breaks for reducing land use intensities in hazardous areas are two options.

Public awareness through information dissemination on natural hazards, and providing educational materials to the construction industry, homeowners, tenants, and businesses are also important. Included in this category are hazard disclosure requirements for the real estate industry and public information campaigns to increase awareness in all sectors of the community.